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YFANTIS.0008P

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Appellant	:	Evangelos A. Yfantis	Group Art Unit: 2863
Appl. No.	:	09/684,150	
Filed	:	October 6, 2000	
For	:	**METHOD AND APPARATUS FOR DETERMINING THE SIZE AND SHAPE OF A FOOT**	
Examiner	:	Tung S. Lau	

APPEAL BRIEF

I. REAL PARTY IN INTEREST

The subject application is owned by and the real party in interest is named inventor Evangelos A. Yfantis.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

III. STATUS OF CLAIMS

On November 1, 2002, the Examiner finally rejected Claims 1-13 and 19.

IV. STATUS OF AMENDMENTS

No amendments have been filed subsequent to the final rejection of November 1, 2002.

V. SUMMARY OF INVENTION

In general, Appellant's invention is a method of determining the size and shape of a human foot. The preferred embodiment of the method is illustrated in flowchart form in Figure 1 of the application.

In a first step, as illustrated in Figures 2-4, an imprint of the foot is obtained in a compressible member. This imprint may be formed by standing upon a compressible foam member (20). (See Application at page 7, lines 8-20).

In a next step, the imprint formed in the compressible member is scanned. The imprint is preferably scanned with an optical scanner, yielding an image comprised of red-green-blue (RGB) scan data at a plurality of points or pixels. (See Application at page 8, line 22 to page 9, line 10).

The depth of the imprint (and thus the foot) is determined at various points or pixels using the image data. In one embodiment, the RGB data at a plurality of points/pixels is converted to YIQ image data, where Y represents the luminance and I and Q the chrominance values. (See Application at page 10, lines 1-8).

In a preferred embodiment, the depth of the imprint at various points/pixels is determined from the luminance (Y) values, including the slope of the luminance value. (See Application at page 3, lines 17-22 and page 12, lines 4-14).

The size of the foot is determined from an enhanced image. In one embodiment, the original scanned image data is passed through a low pass filter to produce an image with enhanced interior areas. The data representing this filtered image is subtracted from the original image (i.e., an "interior image" is subtracted from the whole image), resulting in an altered image which

emphasizes the edge areas of the foot. This altered image may be added back to the original image to create an altered original image with enhanced outer edges. Size information may be obtained by measuring this image at various locations. (See Application at page 13, line 22 to page 14, line 12).

Lastly, it is also possible to obtain the curvature of the foot at one or more locations from the image data. The curvature information is obtained from the previously generated depth information. (See Application at page 14, lines 15-19).

VI. ISSUES

Appellant requests review of the Examiner's final rejections grouped as follows:

(1) Rejection of Claims 1, 5, and 7-9 as being unpatentable over U.S. Patent No. 5,025,476 to Gould et al. in view of U.S. Patent No. 5,502,657 to Endoh and U.S. Patent No. 5,483,601 to Faulkner;

(2) Rejection of Claims 2-4 and 6 as being unpatentable over the combination of Gould, Endoh and Faulkner ((1) above) in further view of U.S. Patent No. 5,786,906 to Shishizuka;

(3) Rejection of Claims 10, 11, 13 and 19 as being unpatentable over the combination of Gould, Endoh and Faulkner ((1) above) in further view of U.S. Patent No. 6,040,860 to Tamura et al.

(4) Rejection of Claim 12 as as being unpatentable over the combination of Gould, Endoh, Faulkner and Tamura ((3) above) in further view of U.S. Patent No. 6,301,532 to Kull et al.

VII. GROUPING OF CLAIMS

The rejected claims are grouped in accordance with the rejections set forth above, namely rejected Claim Groups 1-4.

Rejected Claim Group 1: Appellant asserts that independent Claim 9 stands or falls independent of the other rejected claims of Group 1, namely Claims 1, 5, 7 and 8.

Rejected Claim Group 2: Appellant asserts that Claims 2 and 3 stand or fall together, and that Claims 4 and 6 stand or fall independent of one another and independent of Claims 2 and 3.

Rejected Claim Group 3: Appellant asserts that independent Claim 19 stands or falls independent of the other rejected claims of Group 3, namely Claims 10, 11 and 13.

Rejected Claim Group 4: Claim 12 is the only claim of this group.

VIII. ARGUMENT

A. THE SECTION 103 REJECTION OF CLAIMS 1, 5 and 7-9

The Examiner's Assertions

The Examiner rejected Claims 1, 5 and 7-9 as being unpatentable over U.S. Patent No. 5,025,476 to Gould et al. in view of U.S. Patent No. 5,502,657 to Endoh and U.S. Patent No. 5,483,601 to Faulkner. The Examiner asserts that (sic) "Gould discloses a method of determining the shape and size of a foot with scanning the imprint of the foot to obtain pixel image data, size of a foot, foot imprint, obtaining image data, altered image, curvature information storing the information on computer system." The Examiner indicates that Gould does not disclose the point of depth and luminance value of the data, but that Endoh discloses this approach. The Examiner

indicates that Gould does not disclose a "compressible number" related to the image obtained, but that Faulkner discloses such an application in order to increase calculation speed using a compression algorithm and number. (See November 1, 2002 Action at pages 2-7.)

Appellant's Assertions

Appellant asserts that there are fundamental differences between Appellant's invention and that disclosed by Gould.

As detailed above, Appellant's invention is generally a method of determining the size and shape of a human foot from an imprint formed in a compressible member. The size and shape information is generated from pixel information obtained from a scan of the imprint. Depth information is determined from luminance data generated from the image scan. Curvature information is determined from the depth information. Size information is determined by measuring a generated altered image of the imprint.

Gould does disclose a method of measuring the size and shape of a foot. However, Gould's method is fundamentally different from Appellant's method.

Gould discloses a method and apparatus for determining the size and shape of a foot by "capturing and storing an image of the moiré fringe pattern in an image storage buffer" (See Gould, Col. 2, lines 46-47). This information is obtained by directing light at the bottom of a foot that is located on a support plate (See Gould, Figure 2). In accordance with Gould's method, the "captured image contains the topographically encoded height and shape information carried by the moiré fringes, which information may be determined by computerized analysis of the image" (See Gould, Col. 6, lines 41-45).

It will thus be appreciated that Gould's method of determining the size and shape of a foot is fundamentally different than Appellant's method. Gould derives shape information from a moiré fringe pattern created when light is directed at the bottom of a foot placed on a support plate.

Independent Claim 1

Independent Claim 1 recites a method of determining the size and shape of a foot from an imprint of a foot formed in a compressible member. Claim 1 also recites a method including the steps of scanning the imprint and determining the depth, size and curvature of the foot from the image data of the imprint.

Neither Gould nor any of the other cited references discloses determining the size and shape of a human foot from an imprint formed in a compressible member. Notably, in the previous Office Actions, the Examiner has failed to cite a single reference which discloses this claimed step.

As detailed above, Gould teaches creating a moiré fringe pattern image by shining light directly upon the bottom of a foot. Gould does not disclose or suggest forming an imprint in a compressible member.

In addition, Claim 1 recites the steps of determining the depth, curvature and size of the imprint. Because Gould does not teach providing an imprint, these steps are clearly not disclosed by Gould.

In addition, even when considering Gould's alternative method of determining the shape of a foot, Gould does not disclose determining the curvature. The Examiner points to Figures 6 and 7 of Gould for support that Gould discloses determining the curvature of a foot. However, Figures

6 and 7 simply show generated moiré fringe patterns which are at some locations curved in shape. Gould does not disclose a desire to determine actual curvature, much less a specific method of doing so, using these moiré fringe patterns.

The Examiner has cited Endoh and Faulkner in the general rejection of this claim. It is unclear to Appellant, however, how these references in any way apply to the claimed subject-matter.

Endoh discloses a method of using a single camera to obtain three-dimensional information regarding an object. (See Endoh, Col. 2, lines 52-56). This information is preferably used to control a robotic device. (See Endoh, Col. 9, lines 17-21). Endoh does not teach or suggest forming an imprint of a foot, obtaining a scanned image of the imprint, or generating size, depth and curvature information from the image.

Endoh is method of three-dimensional measurement based upon an image which is picked and/or imaged up by a camera. (See Endoh, Col. 1, lines 5-11). Endoh discloses that a discontinuity may be determined from a sudden change in luminance data for the pixels of the image. (See Endoh, Col. 5, lines 16-17.) However, Endoh does not disclose or suggest determining the depth at one or more points of an imprint from the image data.

The Examiner refers to Faulkner as disclosing a "compressible number" in order to increase calculation speed. Appellant is unsure of the relevance of this fact, as Claim1 does not recite use of data compression. Further, Faulkner appears to be otherwise unrelated to the invention claimed. Faulkner is directed to a biometric measuring device using a scan of a person's hand. Faulkner does not disclose forming an imprint of a foot in a compressible member, scanning that imprint, or using the scanned information to derive curvature, depth or size information.

Dependent Claims 5 and 7-8

These claims stand or fall with Claim 1.

Independent Claim 9

Amended Claim 9 presents a method of determining the shape and size of a foot using image data of an imprint of a foot. This includes calculating the depth at one or more points of the imprint using luminance values and the absolute slope of the luminance.

First, Appellant asserts that the cited prior art, including Gould, does not teach or suggest obtaining a scan of an imprint of the foot, as detailed above with respect to Claim 1.

Moreover, Appellant asserts that neither Gould nor Endoh teaches or suggests a method of using luminance and absolute slope of luminance to generate depth information from an imprint. Gould only teaches using moiré fringe pattern information to determine the size of a foot, including the height of areas of a foot. As indicated in Gould, the size of the foot is determined by measuring the distance between moiré fringes, and the height of the foot above a support plate is determined by the spacing of the grating lines. (See Gould Col. 6, lines 56-68). Thus, Gould does not teach or suggest using luminance values to obtain depth information. The Examiner admits this fact in the rejection of this claim, stating that "Gould did not disclose the point of depth and luminance value of the data." (See November 1, 2002 Action, page 2).

The Examiner asserts, however, that Endoh discloses such an approach. Appellant disagrees. As indicated above, Endoh at most notes that a discontinuity may be determined from a change in luminance. Endoh does not teach specifically determining depth from image information for a

specific pixel corresponding to a point of an imprint. Further, Endoh does not teach or suggest calculating depth from luminance values, including by using a calculated slope of the luminance.

Even if Endoh did teach or suggest such an approach, it is incongruous with the method of Gould. Endoh's method is directed at determining measurement information from a camera image. Endoh discloses that the method is for factory automation, such as for operation of a robotic eye when moving a robotic arm to a proper location. (See Endoh, Col 1, lines 12-17).

On the other hand, Gould teaches a specific method of determining the shape of a foot with a moiré fringe pattern obtained by directing a beam at the bottom of a foot. In this method, "height" information is obtained from the grating pattern. Gould does not teach or suggest use of pixel image data to obtain height information, and in fact teaches away from such an approach. Thus, the combination of Endoh and Gould is improper.

B. SECTION 103 REJECTION OF CLAIMS 2-4 and 6

The Examiner's Assertions

The Examiner rejected Claims 2-4 and 6 as being unpatentable over the combination of Gould, Endoh and Faulkner (discussed above) in further view of U.S. Patent No. 5,786,906 to Shishizuka.

Appellant's Assertions

Appellant asserts that these claims are patentable as depending from independent Claim 1. Further, the claims are believed to be patentable because, as stated above, the asserted base

combination of references cited by the Examiner does not disclose or teach, alone or in combination, the invention as claimed. In addition, each of these claims is believed to be independently patentable for the following reasons:

Claim 2

Claim 2 includes the further limitation to the method of Claim 1 of determining the shape and size of a foot from an imprint formed in a compressible member of obtaining red, blue and green pixel image data of the foot imprint.

The Examiner acknowledges that the base combination of Gould, Endoh and Faulkner does not disclose such a feature, but that Shishizuka discloses such usage.

Obviousness may only be established by combining pieces of prior art if there is some "teaching, suggestion, or incentive supporting the combination." In re Geiger, 815 F.2d 686, 688, 2U.S.P.Q.2d 1276, 1278 (Fed Cir. 1987). The mere fact that the Examiner has been able to find a reference which teaches a single claim element does not mean that the feature, in an entirely different claimed environment, renders the claimed invention obvious. In fact, while the Examiner has cited Shishizuka as disclosing red, blue and green image information, the Examiner has not provided any support for the teaching to combine that element into the base combination which already comprises three uncombinable references.

Gould teaches a method of determining the shape of a foot from a moiré pattern. In accordance with the method, grey-scale image information is used. (See Gould, Col. 6, lines 20-22). Thus, Gould teaches a method of determining the size of a foot using grey-scale information.

Shishizuka teaches a method for determining if an input image is a color or monochromatic image. (See Shishizuka at Abstract). In the passage cited by the Examiner, Col. 19, line 65 to Col. 20, line 24, Shishizuka specifically describes scanning an image, providing RGB and then converting YIQ data. As further disclosed, a "pixel judgement unit 103 judges whether an input pixel is a monochrome or color pixel."

Appellant asserts that there is not only no suggestion to combine the teaching of Shishizuka with Gould, but that Gould teaches away from such a combination. In particular, Gould specifically teaches a method of determining the shape of a foot from a grey-scale image defining a moiré fringe pattern. Thus, Gould does not even teach a method in which color image information exists. Combining the teaching of Shishizuka with Gould only results in a determination that the input image of Gould is a monochromatic image. The combination in no way suggests obtaining color information of an imprint for use in determining the size and shape of a foot from a foot imprint.

Claim 3

Claim 3 stands or falls with Claim 2.

Claim 4

Dependent Claim 4 recites the step of determining depth of imprint information from the "Y" component of collected pixel information.

The Examiner did not specifically detail the applicability of Shishizuka to this claim element. Shishizuka does disclose use of YIQ data in a method determining whether a scanned image is a

color or monochromatic image. However, Shishizuka does not disclose or suggest a method of determining the depth of an imprint using Y or luminance information for a pixel for the point of the imprint where depth information is desired.

Claim 6

Claim 6 recites the additional step of creating an altered image which is used to determine the size of a foot imprint. The Examiner has grouped Claim 6 apart from the rejection of Claim 5. It is not clear, however, how the additionally cited Shishizuka reference applies to this claimed feature. Appellant asserts that Shishizuka does not teach or suggest passing an image through a filter to generate an altered image for sizing a foot imprint.

C. SECTION 103 REJECTION OF CLAIMS 10, 11, 13 and 19

The Examiner's Assertions

The Examiner rejected Claims 10, 11, 13 and 19 as being unpatentable over the combination of Gould, Endoh and Faulkner (discussed above) in further view of U.S. Patent No. 6,040,860 to Tamura et al.

Appellant's Assertions

Appellant asserts that these Claims 10, 11 and 13 are patentable as depending from independent Claim 9. Further, the claims are believed to be patentable because, as stated above, the asserted base combination of references cited by the Examiner does not disclose or teach, alone or

in combination, the invention claimed. In addition, each of these claims is believed to be independently patentable for the following reasons:

Claims 10, 11 and 13

These claims are directed to a method of determining a depth value at one or more points of an imprint with a linear function of the luminance value and absolute slope of the luminance value at one or more points of a scanned image of the imprint.

The Examiner cites Tamura as disclosing use of the linear function of luminance value slope. (See November 1, 2002 Action, Page 4.)

Appellant asserts that the method disclosed by Tamura does not disclose a method of determining a depth value. The teaching of Tamura to which the Examiner refers (Col. 9, lines 16-65) only discloses equations to determine compensation gain and compensation coefficients for the relationship between the luminance signal Y and the gradation-compensated luminance signal Y'. This disclosure does not suggest obtaining depth information from luminance and the slope of luminance values.

In addition, it appears that the Examiner has once again simply picked a random reference which appears to show a claimed element or feature, without consideration as to whether the reference is a proper Section 103 reference. Tamura is directed to a gradation compensation method for luminance levels in an image signal. One skilled in the art would not look to such a reference when attempting to determine the size of a foot from imprint image data.

Independent Claim 19

Independent Claim 19 recites a method of determining the size and shape of a foot from a foot imprint. The method includes calculating the curvature of a foot from the curvature of imprint information. This information is obtained by determining changes in imprint depth. The depth information is obtained from luminance information obtained from RGB color image data. In addition, the method includes the step of filtering the image information and obtaining dimension or foot size information by measuring the filtered image.

Appellant asserts that this claim is patentable over the prior art for like reasons to those set forth above. Appellant notes that this claim recites a combined method of determining depth, size and curvature of a foot from pixel information for points of a scanned imprint. Appellant asserts that even Gould does not, in his entirely different method, teach obtaining all of this information. In addition, neither Gould nor the other references disclose a method of determining all of this information from pixel data of a scanned imprint. In Gould, size information is obtained from moiré fringe pattern information.

D. SECTION 103 REJECTION OF CLAIM 12

The Examiner's Assertions

The Examiner rejected Claim 12 as being unpatentable over the combination of Gould, Endoh, Faulkner and Tamura (discussed above) in further view of U.S. Patent No. 6,301,532 to Kull et al.

Appellant's Assertions

In the rejection of this claim, the Examiner has resorted to citing the combination of no less than five references as supporting the obviousness of the invention. Once again, Appellant asserts that the Examiner has cited the Kull reference for the sole fact that it discloses a specific claimed feature, without regard as to whether the combination of references is proper under Section 103.

Kull is directed to a method of correcting a signal of a sensor, which is an entirely different field and application than that of the present invention. Neither Kull nor the base combination of references suggests or teaches a combination as claimed, including determination of foot imprint depth using luminance pixel data with minimized error.

IX. APPENDIX

The claims on appeal are set forth in Appendix A.

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SUMMARY

For the foregoing reasons, it is submitted that the Examiner's rejections of Claims 1-13 and 19 were erroneous, and reversal of the Examiner's decision is respectfully requested.

Respectfully submitted,

Dated: May 29, 2003 By: _____

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